

Notice of Allowability

Application No.

09/651,425

Examiner

Tuan A. Vu

Applicant(s)

SONGER ET AL.

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to 3/8/07.
2. ☒ The allowed claim(s) is/are 1-44.
3. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some* c) ☐ None of the:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

* Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

4. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
- (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
- 1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____.
- (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.
- Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

- | | |
|------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------|
| 1. <input type="checkbox"/> Notice of References Cited (PTO-892) | 5. <input type="checkbox"/> Notice of Informal Patent Application |
| 2. <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 6. <input checked="" type="checkbox"/> Interview Summary (PTO-413),
Paper No./Mail Date <u>3/17/07</u> . |
| 3. <input type="checkbox"/> Information Disclosure Statements (PTO/SB/08),
Paper No./Mail Date _____ | 7. <input checked="" type="checkbox"/> Examiner's Amendment/Comment |
| 4. <input type="checkbox"/> Examiner's Comment Regarding Requirement for Deposit
of Biological Material | 8. <input checked="" type="checkbox"/> Examiner's Statement of Reasons for Allowance |
| | 9. <input checked="" type="checkbox"/> Other <u>See Continuation Sheet</u> . |

Continuation of Attachment(s) 9. Other: Examiner's Amendments: "AMENDMENT TO CLAIMS FOR EXAMINER'S AMENDMENTS".

DETAILED ACTION

1. This action is responsive to the Applicant's response filed 3/05/2007.

As indicated in Applicant's response, claims 1, 9-11, 17, 22, 30-31, and 43-44 have been amended. Claims 1-44 are pending in the office action.

EXAMINER'S AMENDMENT

2. An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it MUST be submitted no later than the payment of the issue fee.

Authorization for this examiner's amendment was given in a telephone interview with Att. Paul Churilla, Reg. # 47495 on 3/16/07.

The application has been amended as follows:

CLAIMS:

refer to attached "AMENDMENT TO CLAIMS FOR EXAMINER'S AMENDMENTS".

(The file hereinafter attached, "AMENDMENT TO CLAIMS FOR EXAMINER'S AMENDMENTS", will include the amended set of claims, as per the above Attorney's authorization, provided with appropriate markings. This set will replace all of previous versions of claims of record.)

EXAMINER'S STATEMENT OF REASONS FOR ALLOWANCE

3. Claims 1-44 are allowed.

The following is an examiner's statement of reasons for allowance:

A method for creating runtime executable code for a processing element array, comprising:

- (i) partitioning the processing element array (PEA) into a plurality of hardware accelerators (HA); identifying and separating a plurality functions of the program source code based on some runtime attributes of said functions in a plurality of sections;
 - (ii) producing a plurality of hardware dependent executable code (HEC) portions corresponding to said plurality of identified functions, and mapping said plurality of HEC portions to the plurality of HA;
 - (iii) identifying a plurality of hardware variants in the mapped plurality of HEC portions, wherein at least two hardware variants have different hardware configurations that are substantially functionally equivalent;
 - (iv) producing a matrix that defines different combinations of said HA, said hardware variants and said HEC portions; and referencing the mapped plurality of HEC portions using said matrix during execution of the plurality of the HEC portions;
- as recited in claims 1, 22, 43, and 44.

Edwards, "Hardware/Software Partitioning for Performance Enhancement ", discloses using profiling information and identifying critical regions of the original C source code that can be mapped into hardwareC language including a 'hardware' call construct mechanism (due to the inhibitive restrictions of the C language) for invoking associated synthesized functions of a FPGA; providing a hardware synthesizer for placing and routing the logic/block of the FPGA into a configuration file, re-adapted this configuration into compiled specially-structured C code downloaded onto the hardware FPGA for re-execution; thus has disclosed partitioning of

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software applications into ones that contains both software and hardware components, with the critical regions of software executed specially by the combination of HW/Software as synthesized above. However, Edwards does not teach or suggest that:

the identified as critical portions of the original program code are mapped onto a **hardware accelerators which have been previously organized into plurality of partitions from the main hardware-implemented processing element (PE) array as in (i);**

mapping these partitions of accelerators to the plurality of hardware (HW-dependent) executable portions (or kernel sections); and

during runtime execution of the accelerators thus mapped, referencing said mapped plurality of hardware executable portions using information in the matrix generated as in (iv), i.e. the matrix information describing combinations of HW variants described in (iii), HW-dependent code portions, and the hardware accelerators as partitioned above.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Conclusion

4. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Tuan A Vu whose telephone number is (272) 272-3735. The examiner can normally be reached on 8AM-4:30PM/Mon-Fri.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Meng-Ai An can be reached on (571)272-3756.

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The fax phone number for the organization where this application or proceeding is assigned is (571) 273-3735 (for non-official correspondence - please consult Examiner before using) or 571-273-8300 (for official correspondence) or redirected to customer service at 571-272-3609.

Any inquiry of a general nature or relating to the status of this application should be directed to the TC 2100 Group receptionist: 571-272-2100.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Tuan A Vu
Patent Examiner,
Art Unit 2193
March 17, 2007